ATR NSUF Experiment Types

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June 1, 2009

Idaho National Laboratory

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Objectives of Research Forum

- **Bring university researchers together with industry, NRC and DOE research programs**
  - **Develop meaningful research partnerships**
  - **University-led ATR NSUF proposals with strong participation from industry, NRC, and DOE research programs**
  - **Advances in nuclear energy science and technology**

ATR NSUF Research

- **Benefits to industry, NRC and DOE programs**
  - **Potential for in-depth scientific investigation**
  - **Low cost, low risk research program**
  - **Journal publication of research results**
  - **Develop relationships with future employees conducting research that is relevant to you**
  - **No cost access to ATR, ATRC, and PIE capabilities**


UW graduate students conducting hands-on work

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ATR NSUF Research

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- **Benefits to universities**
  - **Develop relationships with organizations conducting nuclear research at all levels, basic to applied**
  - **Journal publication of research results**
  - **Students develop relationships with future employers**
  - **No cost access to ATR, ATRC, and PIE capabilities**
  - **University support funding up to $75K per year ($225 K total) for students and supplies**

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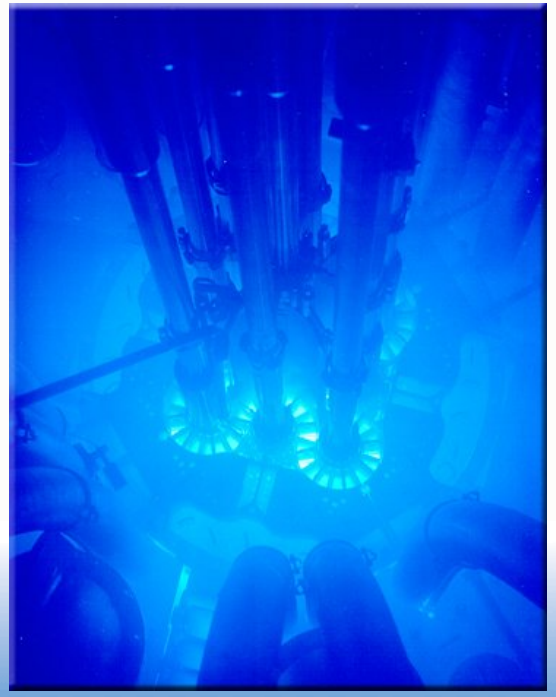
ATR NSUF Experiment Types

- **Irradiation experiments with PIE**
- **PIE only experiments**
- **ATR-C experiments**



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Irradiation Experiments

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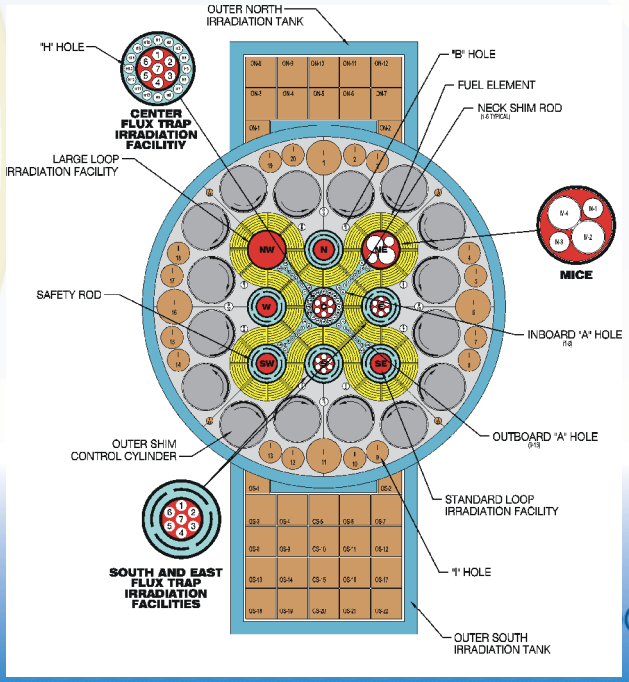
Assistance with:

- Experiment design
- Fabrication of experiment components
- Safety analysis
- Irradiation
- Transportation
- Postirradiation examination
- Disposal of waste
- Project management
- University support



PIE-only Experiments

- **Access to archive materials previously irradiated in ATR, EBR-II, FFTF, etc.**
- **Postirradiation examination at INL and partner facilities**
- **Can ship material to universities if facilities capable of radioactive/ fissile material handling exist**
- **University support**
- **Would like to augment archive with relevant material from LWRs**

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Sample Archive Material

- **EBR-II SURV specimens**
  - **304 SS (4 variants), 347 SS, X-750, 416SS, 420 SS, T1, 17-4 PH, Stellite 6B, Al-bronze, Be-Cu, Ta**
  - **Well documented**
- **EBR-II Hex blocks**
  - **316 or 304 SS**
  - **Some well characterized**
  - **Large cross section ideal for ultrasonic swelling measurements**
- **Proton irradiated FFTF specimens at LANL**
- **HT9 duct irradiated in FFTF at LANL (5-155 dpa)**
- **Advanced ceramics (ZrC, ZrN, TiC, TiN, AlN, SiC)**
  - **UW 'PIE only' project selected in 2009**

Sample Archive Material

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EBR-II fuel pins relevant to fuel cycle research program

- X429
  - Fabrication variables test including U-8Pu-10Zr and U-19Pu-10Zr in HT9 and HT9M
- X441
  - Test to determine affects of zirconium content on FCCI, fuel density on FCMI, and high fluence swelling behavior of HT9
- X489
  - High Pu fuel (U-28Pu-10Zr) in HT9 and HT9M
- X492
  - U-3Zr and U-20.5Pu-3Zr cast into Zr sheaths

ATRC Experiments

- **Low power analog of ATR (< 5 kW, typically 100 W)**
- **Recent feasibility study shows that ATRC is useful for measurement of integral cross sections of reactor materials**
- **(Google ATR-NSUF for report)**
  - **Al, Be, Cr, Mn, Mo**
  - **Ni, Nb, Re, Ti, W, V**
  - **Zr, SiO_2**
- **University support**

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Objectives of Research Forum

We encourage you to ask – "What if…."

- *…we had this irradiation testing capability*
- *…we had this material*
- *…we had this examination method available*
- *…etc.*

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ATR NSUF. The energy of collaboration.

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